adduced the photographs as he interprets their features as corroborating his own observations, forgetting that this implies that he sees the originals only a fraction as well as he should.

Yet even so the photographs have surpassed our hopes, for they disclose more than one could have ventured to imagine. An eye versed in photographic perception and interpretation will easily see in them the canals as lines and the little spots, the oases, at their junctions. Indeed, the camera has shown itself capable of rising beyond the confirmatory into the discovery stage; for one of the plates of the writer was instrumental in the detection of a new canal. A stranger appeared on the plate which when searched for visually in consequence proved to be there. At the next opposition, with our newly devised improvements and with the planet so much nearer the zenith for northern observers, it is confidently to be expected that we shall do still more.

Percival Lowell.

HYDROLOGY IN THE UNITED STATES.

In some of the more recent reports on the hydrology of the United States, the book is prefaced by a general statement as to the intention and scope of the surveys that are being carried out by the geological department of the Government relating to the water resources of the country.

Water supply is regarded as one of the principal national assets, and of more importance to the life and pursuits of the people than any other natural resource. In the arid States the limit of agricultural development is determined by the amount of water available for irrigation. In other States, where the rainfall is greater and more evenly distributed throughout the year, the lack of rain at the proper season often reduces a crop to one-half what it would have been with one additional wetting at the time most needed. Storage, providing water for use when most wanted, will in such a case be as beneficial as where irrigation has to be depended on exclusively. This is especially the case in those districts where market gardening is one of the most profitable agricultural pursuits. Here irrigation is a necessity for making the business profitable.

The increase in the population of cities and towns makes necessary additional water supplies for domestic and industrial uses, in procuring which both the quantity and quality of the water that can be obtained must be considered.

The location of manufacturing plants may depend largely on the water-power facilities and the character of the water. Electric transmission of power has led to the utilisation of water-power for the operation of manufacturing establishments and lighting plants. Water-power is also largely used in some States for log driving, lumbering, and saw-mills, and also for the manufacture of paper from wood pulp and straw.

For all or any of these purposes a knowledge of the flow of the streams and of the conditions affecting that flow, based on trustworthy data, and of the underground resources is essential. For the want of this many schemes for water supply have ended in failure, the plans being made without sufficiently trustworthy information.

The United States Geological Survey has therefore, by means of appropriations by Congress, for several years systematically been engaged in obtaining records of stream flow, the number of stations at which streams were under observation in 1906 being 700. Records are also obtained in regard to floods, precipitation, the relation of the rainfall to run-off of water, evaporation, water pollution, the flow of underground streams, the use of artesian and surface wells, and generally all matters relating to water supply.

The reports relating to the above matters, and also as to the water resources of different States and districts, are issued from time to time, upwards of 200 reports having already been issued.

Notices of these reports, directing attention especially to those papers which are of general interest, have appeared in Nature at various times.

The most recent reports of which we have received copies,[1] eleven in number, relate to the water resources of Georgia, New England, and other districts, the information contained in them being principally of local interest, except Paper No. 201, which has an introduction dealing with the system followed in obtaining the discharge of streams.

THE TESTING OF MATERIALS.

The official report of the proceedings of the fourth Congress of the International Association for the Testing of Materials was recently issued. The congress was held at Brussels in September, 1906, and the report contains a condensed account of the reports presented and a summary of the discussions upon the reports and papers. The congress met in three sections, one dealing with papers on metals, another with papers on cement and artificial stones, and the third dealing with miscellaneous investigations, such as protection of metals against rust, testing of timbers, rubber, &c. Before the sections began their proceedings, Prof. Schüle delivered an address dealing with the life and work of the late president and founder of the association, Ludwig von Tetmajer.

One of the most important matters discussed in the metal section was the method of testing notched bars; after a lengthy discussion the congress eventually adopted the following resolution:—"The congress recognises that the method of testing notched bars appears capable of giving extremely interesting results." The congress did not, however, adopt a resolution which was moved to the effect that the method should be experimentally introduced into certain specifications.

In regard to the subject of ball-pressure tests, the congress eventually adopted the following resolution:—"The present congress desires that in the acceptance of metallic materials tests of tenacity should be supplemented as often as possible by a determination of the Brinell hardness number, the latter test being performed for the object of collecting information."

During the meeting of the association a metal-testing laboratory was installed at Brussels in order to show in action the various modern processes employed in the testing of materials. The tests made were micrographic, determination of the critical points, impact tests on notched bars, Brinell ball tests, and shearing tests. The congress has published a small illustrated pamphlet descriptive of the various testing appliances which were at work in this metal laboratory, with a brief note on the results obtained.

T. H. B.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Cambridge.—The Vice-Chancellor gives notice that the election of a professor of agricultural botany will take place on Monday, March 16. Candidates for this professorship are requested to communicate with the Vice-Chancellor on or before Wednesday, March 11.

Sir Ernest M. Satow, G.C.M.G., has been appointed to the office of reader on Sir Robert Rede's foundation for the present year. The lecture will be given in the Senate house on Saturday, June 13.

London.—In connection with the supplementary vote of 6000*l.* for the Imperial College of Science and Technology at South Kensington, being part of the annual Government subvention of 20,000*l.* to the college, Sir Philip Magnus inquired last Friday in the House of Commons whether the 20,000*l.* was in excess of the cost of maintenance of the Royal College of Science and the Royal School of Mines, which had been incorporated in the Imperial College. In reply, Mr. Lough explained that the grant of 20,000*l.* was arranged by the Board of Education under the late Government; in addition, the Imperial College would have the fees paid by students, including fees paid by the Board of Education for scholars nominated by the Board. In reply to a further inquiry by Sir Philip

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[1] Water Supply and Irrigation Papers. (Washington: Government Printing Office.)

Magnus whether the Government intended to appoint a Royal Commission in reference to the relation of the Imperial College to the University of London, no information appears to have been forthcoming.

Oxford.—The annual report of the delegates for instruction in forestry shows that the average number of forestry students in 1907 was fifty-seven. The forest garden and experimental plantations in Bagley Wood have been much increased during the year, and the lack of accommodation is about to be met by the generosity of St. John's College. A block of buildings for the accommodation of the professor of rural economy was erected in Parks Road during the years 1906–7. It is now proposed to add further accommodation for the forest branch, consisting of a lecture theatre, a class-room, a museum, a library, and a professor's room. The new buildings will be ready by the end of 1908.

The degree of Doctor of Science has been conferred on Mr. E. H. J. Schuster, New College, for his contributions to biometrical science.

We learn from the *Revue scientifique* that by a decree of February 10, inspectors of technical instruction are to be appointed in France. Ordinary inspectors will be chosen from among the directors and teachers of technical schools, and district inspectors will be selected from competent leaders of industrial or commercial enterprises.

The Secretary of State for India has appointed a committee to inquire into and report upon the present system of selecting, and of training after selection, candidates for the Indian Forest Service, and to make recommendations. The committee is constituted as follows:—Mr. R. C. Munro Ferguson, M.P., chairman; Sir John Edge, K.C., member of the Council of India; Sir W. T. Thiselton-Dyer, K.C.M.G., F.R.S.; Mr. E. Stafford Howard, C.B.; and Mr. St. Hill Eardley Wilmot, Inspector-General of Forests in India.

The London Inter-Collegiate Scholarships Board will hold in May a combined examination for twenty scholarships and exhibitions tenable at University College, King's College, and the East London College. Candidates must have matriculated at the University of London or have passed an equivalent examination, and be under the age of nineteen years on October 1 next. The total value of the scholarships offered exceeds 1700*l.* Full particulars may be obtained from the secretary to the Board, Mr. A. E. G. Attoe, University College, Gower Street, London, W.C.

We learn from the *Times* that at the meeting of the council of the University of Paris on February 24, the Vice-Rector presented to that body a loving cup, a gift made by the University of London to the University of Paris as a souvenir of the hospitality it received last summer. The cup is silver-gilt, repoussé and chiselled, and is nearly 3 feet high. The lid is surmounted by an allegorical figure, while the body of the cup bears on its outside the arms of the Universities of Paris and London, two escutcheons emblematic of the French Republic and Great Britain, and three figures symbolic of science, letters, and art.

The Calcutta University will celebrate its jubilee this year by conferring the following honorary degrees at the Convocation to be held on March 14:—*D.Litt.*, the Hon. Sir A. H. L. Fraser, K.C.S.I., Lieut.-Governor of Bengal and Rector of the University. *D.L.*, the Hon. Sir Subramaniya Aiyar, K.C.I.E., Vice-Chancellor of the Madras University; the Hon. Mr. Justice Chatterjee, C.I.E., Vice-Chancellor of the Punjab University. *D.Sc.*, the Hon. Dr. Justice Mukerjee, Vice-Chancellor of the Calcutta University; Prof. A. Schüster, F.R.S.; the Rev. Father E. Lafont, S.J., C.I.E., late Rector of St. Xavier's College, Calcutta; Mr. T. H. Holland, F.R.S., director of the Geological Survey of India; Dr. G. Thibaut, C.I.E. *Ph.D.*, Dr. R. G. Bhandarkar, C.I.E., late Vice-Chancellor of the Bombay University; Sir Gooroo Das Banerjee, D.L., late judge in the Calcutta High Court; Sir H. H. Risley, K.C.I.E., C.I.E., secretary to the Government of India; Prof. P. C. Rây. *M.D.*, Surgeon-General G. Bomford, C.I.E., Director-General of the Indian Medical Service.

Among the gifts to colleges and other institutions of higher education announced in *Science* during the past few months, the following, of 10,000*l.* or more, may be mentioned. By the will of the late Mr. D. Willis James 20,000*l.* was bequeathed to five separate institutions, including Columbia and Yale Universities. Prof. J. H. Hammond, by an additional 1000*l.*, has brought his gift to the Hammond Metallurgical Laboratory of Yale University to 25,400*l.* By the will of Mrs. Sarah E. Potter, of Boston, Harvard University received a bequest of 10,000*l.*, to be used in connection with the Gray herbarium. Columbia University has received an anonymous gift of 20,000*l.* Yale University has benefited to the extent of 10,000*l.* by the will of the late Mr. Silliman Bladgen. Mr. John D. Rockefeller has added 438,200*l.* to his previous gifts to the University of Chicago, making the total amount of these nearly 5,000,000*l.* Colorado College has completed an addition of 100,000*l.* to its productive funds, towards which Mr. Andrew Carnegie contributed 10,000*l.* According to the daily papers, Bradley Polytechnic, of Peoria, Ill., benefits to the extent of nearly 600,000*l.* by the will of the late Mrs. Lydia Bradley. Mr. Andrew Carnegie has also given 40,000*l.* to Berea College and 15,000*l.* to Illinois College, at Jacksonville.

Another attempt at a settlement of the controversy relating to religious instruction in public elementary schools was introduced in the House of Commons on Monday in the form of a Bill brought in by Mr. McKenna, President of the Board of Education, "to regulate the conditions on which public money may be applied in aid of elementary education in England and Wales, and for other purposes incidental thereto." The Bill proposes that in future there should be but one type of public elementary school, provided, controlled, and managed by public authority, and the teachers to be appointed without religious tests. Every public elementary school receiving rate aid would thus be of the type of Board or County Council schools, and no child would be compelled to attend any other kind of school. The religious instruction given in these schools would be the same as that given in Board and county schools for the past thirty-eight years. Voluntary or Church schools would not have the support of public money in single-school parishes, for there the State would not recognise any other school than a public elementary school. In other cases, voluntary schools, when recognised as providing efficient instruction in secular subjects, would receive State aid in the form of grants, but no rate aid, the amount of the Government grant in both county and recognised voluntary schools being 47*s.* per annum for each child in attendance. The Bill was read a first time, after it had been vigorously condemned by Mr. Balfour and other members of the Opposition.

At the prize distribution to students at the Battersea Polytechnic on Wednesday, February 19, Lord Stanley of Alderley remarked that when the polytechnic movement was first started it was a general idea that the work in the institutions was to be largely recreative. But though the importance of the social side and of its influence for the good of the students was recognised, in course of time the educational work asserted itself and became predominant. In the more modern institutions, the value of the day work with its regular courses is being more fully recognised. While the evening work is kept up to as high a standard as possible, the work done in the day classes is more thorough; the students obtain a greater mastery of their subjects, and therefore it is of greater importance than that of the evening side. Remarkable advances have been made in this direction in the great technical institutions, such as those at Sheffield, Bristol, and Manchester. In the management of institutions like the Battersea Polytechnic, there should be a strong local element which knows what are the requirements of the particular districts. It is necessary to separate what may be called the common work of education from that of the particular work of technical instruction as applied to arts and crafts. A comparison between the requirements for domestic economy training a few years ago and those which are now considered necessary to have any influence on the home life and habits of people shows that a much higher standard has been reached. The work carried on at the polytechnics will bear good fruit, and it is to be hoped that the London County Council will see its way clear to provide the means so that the polytechnics of London may furnish an example to every town in the United Kingdom and in all parts of the world.

THE fifteenth annual general meeting of the Association of Technical Institutions was held on Friday and Saturday last at the hall of the Drapers' Company. Sir Horace Plunkett, the retiring president, occupied the chair during the early part of the proceedings, and was succeeded by Sir Norman Lockyer, K.C.B., who was unanimously elected president for the ensuing year. Sir Norman Lockyer in his address referred to the progress that has taken place in educational methods in recent years, but pointed out that there is a lack of coordination between primary and secondary schools or technical schools. We have now a good system of elementary education, but there is a terrible wastage after the primary school. He pleaded for a fuller recognition of continuity in education and of the high standing of technical institutions in an organic system. At the second day's meeting there was a discussion on trade or craft schools, and eventually the following resolution was adopted:—"That this association, fully recognising the necessity for a comprehensive and graded scheme of technical education, embracing all sections of the community, request the council to make an inquiry with a view to ascertaining the best conditions for the development of technical education in relation to the training of workmen." In opening the discussion, Prof. W. M. Gardner, of Bradford, said that of 1000 boys passing through elementary schools, and ultimately taking positions as industrial workmen, foremen, or managers, probably not more than forty pass through a secondary school and not more than three or four attend a day technical school. The great problem is, therefore, that of the boys who leave the primary schools at thirteen and fourteen, or even earlier, and who constitute 950 out of every 1000 boys of that age. Three courses seem to be open, namely:—(1) to provide specialised technical instruction during the latter portion of the primary-school course, combining it with the general subjects in the time-table; (2) to pass the lads forward from the primary school to specially arranged trade schools for one or two years; and (3) to rely, as hitherto, on evening schools for technical instruction. How far the first plan is practicable, or even desirable, appears doubtful. It is educationally unsound to give technical instruction in a trade without first dealing with the underlying sciences in an elementary manner. The provision of special trade schools seems, the speaker said, to offer a more likely solution of the problem.

SOCIETIES AND ACADEMIES.

LONDON

Geological Society, February 5.—Sir Archibald Geikie, K.C.B., Sec.R.S., president, in the chair.—Antigorite and the Val Antigorio, with notes on other serpentines containing that mineral: Prof. T. G. **Bonney**. It is not certain that the first described specimen of antigorite was really found in the Val Antigorio. The rock probably does not occur there *in situ*, though it is found in pebbles, &c., from tributaries. Other specimens of antigorite-serpentine were described. The origin of the mineral is discussed. Pressure is essential; it can be formed from augite, and there is evidence of its coming from this mineral.—The St. David's Head "rock series" (Pembrokeshire): J. V. **Elsden**. These intrusions are of complex composition. There is a high magnesia percentage. There is no evidence of differentiation *in situ*, but the facts suggest a common origin from a differentiated magma basin. The rocks afford facilities for the study of both rhombic and monoclinic pyroxenes. Rhombic pyroxene generally crystallised earlier than the monoclinic pyroxene. There are two varieties of augite. The relation of these types lends support to the perthitic theory. The probable age of the intrusions is not greater than that of the earth movements which folded the Arenig shales in this district.

Linnean Society, February 6.—Dr. A. B. Rendle, vice-president, in the chair.—Specimens and lantern-slides of leaf impressions from the Reading beds: H. W. **Monckton** and O. A. **Shrubsole**.—Fruits and seeds from the pre-Glacial beds of Britain and the Netherlands, especially the Pakefield specimens from the neighbourhood of Lowestoft (Cromer forest bed), and from Tegelen, near Venloo, in the province of Limburg, Netherlands: Clement **Reid**.—The use of large quantities of commercial concentrated soda carbonate when boiling refractory deposits: Mrs. E. M. **Reid**.—A botanical expedition to Central Fokien: S. T. **Dunn**. In April, May, and June, 1905, a botanical expedition was undertaken, with three native collectors and one Chinese herbarium assistant, to the centre of the province of Fokien. The difficult journey from Foochow to Yenping was successfully accomplished, and enough stores deposited at that town to enable a large collection of plants to be made. The central portion of this province, which is as large as England and Wales combined, had never previously been visited by a botanist, and, as might be expected, many novelties were discovered, and are here described, amounting to at least forty new species.—Some new Alcyonaria from the Indian and Pacific Oceans: preliminary notice: Ruth M. **Harrison**.

Royal Anthropological Institute February 11.—Prof. W. Ridgeway, president, in the chair.—An additional note on New Guinea games: Dr. A. C. **Haddon**. The games were of various descriptions, and included a series of string figures.—A new instrument for determining the colour of the hair, eyes, and skin: **J. Gray**. The instrument was a simplified form of Lovibond's tintometer, by means of which hair-, eye-, and skin-colours could be classified by comparison with a series of standard coloured glasses. These standard glasses can be reproduced an indefinite number of times with the greatest precision by Lovibond's method, so that any number of observers can be provided with identical colour-scales. A series of locks of hair, arranged by the naked eye, from blonde to jet black, was exhibited, and curves showing the colour-elements of this series, as obtained by Lovibond's tintometer, were shown on the screen. The curves showed that the locks contained two coloured pigments, namely, orange and a yellow, and a black pigment. The black pigment increased uniformly in amount from blonde to black, and evidently formed the basis of the arrangement of the series by the naked eye, because the amount of orange and yellow pigment was practically constant throughout the whole series. A second series of locks of red hair was exhibited, arranged by the naked eye from light to dark red or auburn. Analysis showed that the orange pigment was predominant, and formed the basis of the classification. A diagram, exhibited to show the correlation between orange and black in the two series of locks, pointed to the conclusion that red hair was derived from dark hair by the conversion of more or less of the black pigment into an equal amount of orange pigment, while fair hair was derived from dark hair by a reduction of both the black and the orange pigments.

Institution of Mining and Metallurgy, February 20.—Prof. W. Gowland, president, in the chair.—The alloys of gold and tellurium: Dr. T. K. **Rose**. An examination of the mixtures of gold and tellurium by means of the Roberts-Austen recording pyrometer, and observing polished sections under the microscope. The main conclusions arrived at were:—(1) A compound, $AuTe_2$ or Au_2Te_4, containing 43·59 per cent. of gold, and corresponding in composition to sylvanite or calaverite, is formed when gold and tellurium are melted together in certain proportion; this compound fuses at 452°. (2) Two eutectic mixtures are formed, containing 60 per cent. and 20 per cent. of gold respectively. These alloys correspond in composition to the formulæ $AuTe$ and $AuTe_6$. Under the microscope they do not show the characteristic banded eutectic structure, but there are certain indications that they are true compounds. (3) All the alloys of gold and tellurium are brittle. (4) All those containing less than 60 per cent. of gold fuse at temperatures between 397° and 452°.—A method of settling slimes, as applied to their separation from solution in cyanide treatment: H. G. **Nichols**. The principle involved is that of removing the